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When climate change is missing: Media discourse on coal mining in the Czech Republic

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ABSTRACT

One of the EU's main decarbonization goals is a reduction in the energy use of coal. It would be a mistake, however, to assume that public support for decarbonization can be gained automatically by pointing out threats from climate change, particularly in light of the role coal plays in the local and national economy and in energy security. In this article we search for factors affecting public support for a coal phase-out in media content. According to the theory of *agenda setting*, the media establishes problems calling for solutions and influences public perceptions of the (un)importance of those problems. We illustrate this case on the example of the Czech Republic. The paper demonstrates that Czech media has cultivated a discursive environment in which coal mining is separated from coal combustion, neglecting the inevitable interconnection of these two processes; coal consumption is not characterized as an environmental problem; and the economic problems of private companies more easily become public problems, making future coal phase-out policies harder to implement.

1. Introduction

In light of the problem of anthropogenic climate change, the EU has committed itself to the decarbonization of its energy system(s) (European Commission, 2016, 2011). Phasing out coal is an inevitable part of this process (Johnstone and Hielscher, 2017; Myhrvold and Caldeira, 2012; Rocha et al., 2017; Spencer et al., 2018), especially considering that coal's ratio of greenhouse gas emissions to heat content is considerably higher than that of other available energy alternatives (IEA, 2016), coal represents a significant portion of the EU's gross energy consumption (16.2% in 2015), and "clean coal" technologies, such as CCS, are still far from being a plausible and commercially viable option (Herzog, 2015). Phasing out coal therefore seems to be a crucial step towards decarbonizing (the energy) industry.

Some European countries, such as Denmark, Spain, Luxembourg, Austria and the UK, have already reduced their coal consumption in recent decades (European Commission, 2018; International Energy Agency, 2017). However, these phase-outs were driven primarily by structural problems of the industry, the depletion of domestic reserves, and the increasing competitiveness of energy alternatives and less so by climate concerns (in particular, see the examples of the UK (Beatty et al., 2007; Turnheim and Geels, 2013) and Denmark (Correljé and Verbong, 2004)). Intentional top-down policies with a direct focus on minimizing coal consumption in coal-intensive countries such as Germany are still in their infancy and face multiple challenges. In these countries, coal-restricting policies may produce structural problems, such as higher levels of unemployment and lasting damage to the subsequently deindustrialized communities (Foden et al., 2014; Johnstone and Hielscher, 2017). As such, they inevitably affect a multitude of societal actors and raise difficult questions about fairness or unfairness in the distribution of gains and losses in the phase-out process (Aklin and Urpelainen, 2013; Evensen et al., 2018; Healy and Barry, 2017; Heffron and McCauley, 2018; McCauley and Heffron, 2018).

Furthermore, the coal industry itself tends to create what Johnstone and Hielscher (2017) have identified as a specific "cultural identity" or what Mayer (2018) and Bell and York (2010) have described as a "community economic identity." These phenomena describe situations in which the community or even the whole region embraces the coal industry as a "cornerstone of their collective sense of self". This identity may stem from the importance of the mining industry for the livelihood of the community and/or for the economy and sustainability of energy supplies of the state, from the perceived role of domestic coal for the independence and security of the country, or from the historically pivotal role of coal mining for a prosperous domestic industrial sector.

In such a complex social environment, it is difficult to imagine coal-intensive countries being able to step away from coal solely with reference to climate change problems. To prepare and implement

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successful policies to phase out coal, various societal factors need to be identified and understood, including how the coal industry is perceived, framed, and valued by society (Rayner, 2010; Wüstenhagen et al., 2007). In the construction of the role of coal in society, the media serves as an important link between the public sphere and decision makers. The media acts as a forum where problems that require state intervention are highlighted as well as a stage where activists and policymakers seek legitimization for proposed solutions and corresponding political actions (Jann and Wegrich, 2007; Wagner, 2018). Therefore, insight into the presentation of coal in media can foster our understanding of the challenges of phasing out coal and what types of solutions may be viable in a specific national or regional context.

This article analyzes the presentation of coal mining in the Czech media. Alongside Germany and Poland, the Czech Republic is among the three largest coal consumers in the EU. Together, they account for as much as 57% of the EU's total coal consumption (Statistical Office of the European Communities, 2018a), thus placing their phase-out projects into the spotlight of the Union's decarbonization efforts. While Germany is posed to introduce its specific phase-out plan by the end of 2018 (BMU, 2018) and Poland has only recently hinted that it is considering a reduction in the use of coal (Reuters, 2018), the Czech Republic has a unique, 28-year-old history of coal-restricting policies motivated by environmental reasons. In 1991, the country established territorial mining limits to draw a clear line between where opencast coal mining would be acceptable and where not (Rečka and Ščasný, 2017). The limits restricted mining activities to borders that were far smaller than the actual coal reserves in the country, forcing companies to redirect investments away from the coal industry (Sivek et al., 2017; Vlček and Jirušek, 2015). At the same time, the coal reserves outside those limits have not been legally abandoned, and the limits themselves have only been formalized in the form of an executive order. Because they are only subject to consideration by the government currently in office at any given time, the question of redrawing the limits has become a battleground of various political and economic interests. Virtually every administration since the establishment of the limits has been engaged by interest groups and has had to reconsider and eventually reaffirm the limits. The Czech case thus stands out among other coal-intensive countries that have sought to restrict the use of coal due to this recurring dilemma of maintaining previously established coal-restricting policies.

Such a political context naturally yields very specific discourses about coal mining. In this article, we explore the related media discourse. Drawing largely from agenda setting theory (McCombs, 2005; McCombs and Shaw, 1972), we approach coal mining as a so-called "object" that is referred to by the media. Our analysis is concerned with the composition of this object. More specifically, we tackle the following three research questions: What attributes does the object of coal mining in the Czech national media agenda comprise? How salient are those attributes? How does the frequency of attributes vary over time?

2. Literature review

We found little research directly relevant to the portrayal of coal mining in the media apart from a few studies analyzing the case of Australia, the largest coal exporter in the world. Bacon and Nash (2012) showed that Australian coal mining interests interact with the media domain as well as with the political domain, resulting in varying coverage of climate change. This particular study shows that business coverage is present across newspapers but climate change coverage varies and depends on the given newspaper's position (Bacon and Nash, 2012). Analysis of the framing of conflicting industries (mining and tourism) in Australia showed the existence of a highly polarized debate, which first poses a problematic case for policy response, and second, is reported locally and nationwide despite its local relevance (McLennan et al., 2017).

Because of the scarcity of texts focusing on media discourses on coal mining, here we present an overview of two more general domains for which analyses of media narratives exist – energy and climate change. A study on the framing of a coal power plant project in Southern Africa showed how the concepts of "energy security" and "climate change" are discursively formed and how the contested issue of plant construction reduced the space for policy responses over time (Rafey and Sovacool, 2011). A few studies have dealt with media discourses on nuclear power. Culley et al. showed that media articles on nuclear power which are supposedly "informational" and "neutral" often contain hidden pro-nuclear and/or anti-nuclear messages (Culley et al., 2010). A case study on Japan found a shift in media perceptions of nuclear power in the aftermath of the Fukushima disaster but without inducing any discussion on (renewable) alternatives (Biddinika et al., 2014). Two studies on the extraction of unconventional natural gas reserves in the UK and Poland highlighted radically different framings of the commodity. While unconventional gas was portrayed as a safety issue regarding extraction practices in the UK (Jaspal and Nerlich, 2014), it was portrayed as a matter of national pride and energy security in Poland (Jaspal et al., 2014). Smith et al. showed that there was an interdependent relationship between media framing and legislative regulation attempts wherein the media not only cover proposed energy bills but at the same time the media coverage itself affects the legislative activity and process (Smith et al., 2016).

A great deal of attention has been given to research on the media's handling of climate change. A significant number of papers highlight the theoretical mechanisms of media agenda formation and uncover various types of bias in reports. Boykoff and Boykoff have shown how media norms introduce bias as perceived scientific uncertainty about climate change allowed fringe climate-skeptic voices to become a relevant part of the media agenda (Boykoff and Boykoff, 2007, 2004). Carvalho points out deeply-rooted ideological differences among individual newspapers which strongly affect their coverage of climate change (Carvalho, 2007). Media organizations struggle with the discrepancy between the global nature of climate change and the national logic of media operation. To deal with this, media outlets have devised "domesticated" narratives on climate change (Olausson, 2014, 2009). What starts as an all-encompassing discussion of climate change has been shown to proliferate into other seemingly unrelated topics over time (Lyytimäki, 2011). A great deal of empirical research has also been conducted on the media–climate nexus itself. There is a growing body of literature with single-country case studies (Gkiouzepas and Botetzagias, 2017; Horta et al., 2017; Liu et al., 2008; Schneider and Ollmann, 2013; Stamm et al., 2000; Stoddart et al., 2016; Stoddart and Tindall, 2015) as well as some comparative pieces analyzing differences in coverage among various states (Schmidt et al., 2013). For an extensive overview of the case study literature, we refer to a piece by Schmidt et al. (2013), and for a more detailed overview of research on the media discourse on climate change, we refer readers to Anderson (2009).

3. Theory and research design

Understanding media content provides a general proxy for the content of public discourse (see McQuail, 2010). Though there is neither a direct causal relationship between the two, nor is media content the single factor shaping public discourse, the production, content, and reception of mass media systematically and notably contribute to building a discourse on any topic of interest (see Olausson and Berglez, 2014) and can make certain discourses visible while tuning others out (Boykoff, 2008), as demonstrated in the literature review above. The way language is used to present a given issue is an important part of the process of shaping related policy (Schneider and Ollmann, 2013). Policy is formulated in relation to the ideas and beliefs already grounded in the public discourse (Scrase and Ockwell, 2010). The language used by media thus plays a crucial role (Steffek, 2009), as it might lend or prevent legitimacy to certain actors and their interests

Table 1
List of daily newspapers in the corpus. Bold titles indicate dailies published over the whole period of 1996–2016.

Title	Published	Owner	Average number of readers	Type of journalism	Number of articles
Blesk	1992 -	Czech News Center	1,237,000	General tabloid	154
MF DNES	1990 -	MAFRA	806,000	General broadsheet	2,249
Metro	1997 -	MAFRA	420,000	General broadsheet	70
Sport	1953 -	Czech News Center	359,000	Particular (sport)	3
Právo	1990 -	Pravo	289,000	General broadsheet	1,053
Aha!	2004 -	Czech News Center	254,000	General tabloid	23
Lidové noviny	1893 -	MAFRA	210,000	General broadsheet	593
Hospodářské noviny	1990 -	Economia	181,000	General broadsheet	1,077
Halo noviny	1991 -	Futura a.s.	–	General broadsheet	779
Slovo	1945–2000	–	–	General broadsheet	144
Zemské noviny	1996–2001	Vltava-Labe-Press	–	General broadsheet	160
Telegraf	1993–1997	INTEGRA, a.s.	–	General broadsheet	23
Super	2001–2002	e-Media, a.s.	–	General tabloid	3
Impuls	2003–2003	–	–	General broadsheet	3
Práce	1945–1997	–	–	General broadsheet	15
Šíp	2005–2009	Vltava-Labe-Press	–	General tabloid	14

(Cox and Pezzullo, 2016).

More specifically, this research applies the theory of agenda setting. McCombs and Shaw (1972) showed that media organizations have power over selecting issues deemed newsworthy. Together, these issues, called "objects," form the content of media – the so-called "media agenda." McCombs and Shaw demonstrated a high correlation between the content of the media agenda and the importance that the general public ascribed to objects contained in the media agenda (McCombs and Shaw, 1972). Thus, the media fulfill an "agenda-setting" role, i.e. the media (un)intentionally create a sense of importance regarding newsworthy issues. This theoretical proposition, which McCombs calls "first-order agenda setting" (McCombs, 2005), has developed into a whole strand of agenda-setting research (for an overview, see Scheufele and Tewksbury, 2007).

Further refinement of agenda setting theory has shown that the objects in the media agenda may be approached from different perspectives. Certain aspects of objects, referred to as "attributes," may be highlighted, while others may be suppressed. Through this process, the presentation of the object changes. This is called "second-order agenda setting" (McCombs, 2005). Moreover, it is not only the content of the media agenda but also the amount of coverage of particular objects or their attributes in the media agenda that matter. It has been shown that the amount of coverage correlates with the public's perception of an object's importance. Objects or attributes that are covered more tend to be perceived as more important, while objects or attributes with marginal coverage tend to be perceived as insignificant. This is called object or attribute "salience" (see McCombs, 2005).

Public discourse, however, cannot be assumed to fully mirror the media agenda, as pointed out by Olausson (2011). Taking that criticism into account, yet acknowledging the importance of the media, we focus on the media agenda over the issue of coal mining. Because we have chosen an issue which is an already established object in the media agenda, we specifically investigate second-order agenda setting, i.e. the themes and issues ("attributes") of coal mining and the "attribute salience" generated by their coverage. On this basis we have formulated three research questions.

RQ1: What attributes does the object of coal mining in the Czech national media agenda comprise?

The first research question explores the content of the Czech national media on the issue of coal mining and establishes the empirical basis of the research.

RQ2: How salient are those attributes?

The second research question is closely connected to the answer to RQ1, which will allow us to estimate the salience of individual attributes. More frequent themes and issues can be regarded as more salient, while themes which are only sparingly addressed can be seen as less salient.

RQ3: How does the frequency of attributes vary over time?

The third research question further develops the answer to RQ2. Splitting the data by year will provide us with a better understanding of the variation in attribute salience over time.

4. Data and research method

4.1. Data

Our data set consists of all articles published on the topic in the Czech national press, collected through the Anopress IT Czech media monitoring database (Anopress IT, n.d.). Any article containing the key phrase "coal mining" ("*těžba uhlí*") was included in the data corpus. The phrase choice is warranted by our interest in coverage of domestic coal consumption, which is tightly linked to mining activity. We discuss this in further detail in the case description chapter.

The key-phrase search yielded articles in 16 daily newspapers. Nine of these remain in publication to this day, while the other seven were discontinued over time (see Table 1). The included dailies include both tabloid as well as broadsheet newspapers. Table 1 also indicates their average daily readership between 2008 and 2016, computed from annual media research results (see Appendix A for details), as well as ownership information. It is worth noting that the Czech News Center is partially owned by Daniel Křetínský, Chairman of the Board of Directors of the EPH Group, which is involved in Europe-wide operations in the fossil fuel industry. EPH is involved in trading coal and in operating coal-fired power plants as well as coal-fired heating plants (see Energetický a Průmyslový Holding, n.d.).

The time frame was set between 1 January 1996 and 31 December 2016, resulting in 6121 articles. The lowest annual number of articles was 163 in 1996, while the highest was 462 in 2006. The average number of articles per year is 291.48. The average article length was 252.62 words; the median was 190 (see Appendix B for more details).

The coverage of the issue is uneven across the sources. Five current broadsheets make up more than 90% of the corpus. Tabloid dailies seem to cover the issue only occasionally. This is apparent from Fig. 1, which captures annual frequencies of articles containing the key phrase per paper, with the highest overall coverage on the left. The aggregate number of all articles per newspaper is included in the last column of Table 1.

4.2. Method

The research proposed in this paper warrants the use of automated

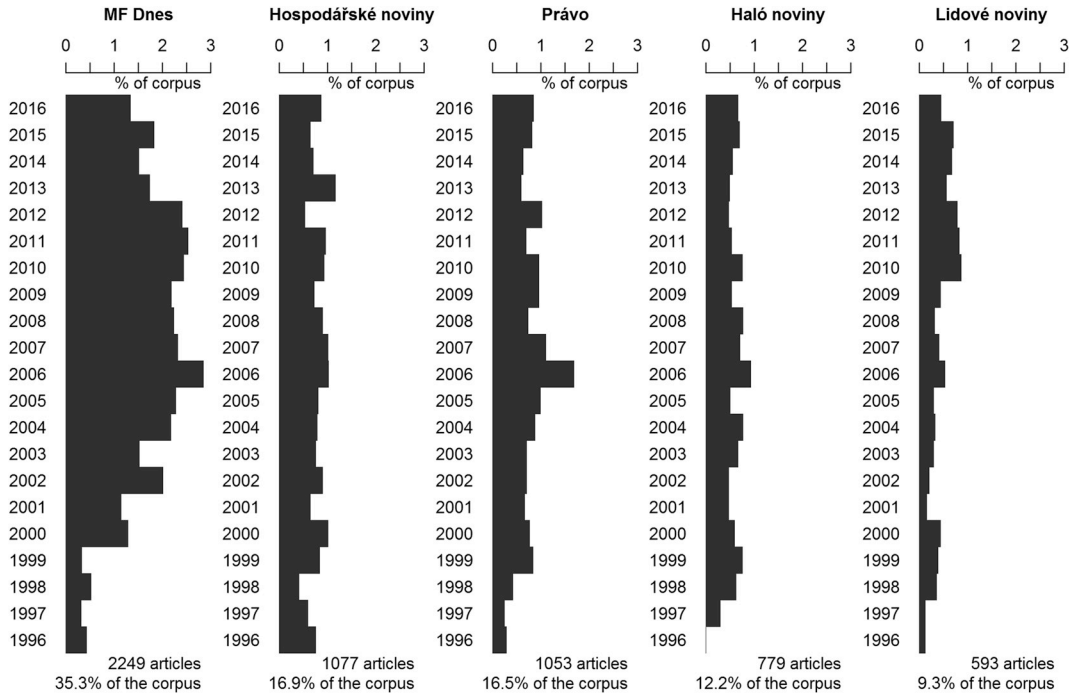

Fig. 1. Annual media coverage according to relative frequency (most frequent on the left).

content analysis, which allows users to extract themes from texts—a process called topic modeling (see Grimmer and Stewart, 2013). It is a fully unsupervised approach that extracts word clusters called "topics." Topics are distributions of words appearing in a fixed vocabulary (i.e., words from the corpus) (Blei, 2010). They may be interpreted as issues, events, or themes and generally summarize the content of a corpus (Jacobi et al., 2016).

Topic modeling has been used in various domains for the purpose of exploration and/or explanation of discursive formations. These range from policy arenas, such as discussions within the U.S. Congress (Grimmer, 2010; Quinn et al., 2010) or EU institutions (Nerghes, 2016), and media discourse (Jacobi et al., 2016; Törnberg and Törnberg, 2016) to climate skepticism (Boussalis and Coan, 2016) and energy-related issues (Nowlin, 2016). The utilization of topic modeling to measure a media agenda and the salience of objects within a media agenda is still in its early stages (Korenčić et al., 2015).

We chose the most commonly used topic model, known as Latent Dirichlet Allocation (LDA) (Blei, 2012; Blei et al., 2003). Topics and their proportions in documents are regarded as latent variables. The conditional distribution of these variables is first randomly assigned and then approximated according to the documents in the corpus. To achieve this approximation, we used LDA in connection with Gibbs sampling (Griffiths and Steyvers, 2004) as implemented in the "topicmodels" package of R (Grün and Hornik, 2011). This process results in a model that calculates a predefined number of topics. Each topic comprises a set of words, ordered by their probability of belonging to the topic. The model also contains probabilities of topics for each document.

A formal description of the LDA model has been eloquently provided by Boussalis and Coan (2016):

1. Each topic denoted k is drawn from a topic distribution $\theta \sim Dirichlet(\alpha)$.
2. Term distribution β for each topic is represented as $\beta \sim Dirichlet(\eta)$.
3. For each of the N words w_n, first randomly sample a topic $z_n \sim Multinomial(\theta)$ and second choose a word w_n from $p(w_n|z_n, \beta)$.

For further technical and mathematical details of the LDA model, we refer the reader to the paper by Blei et al. (2003).

We preprocessed the data in five consecutive steps, based on the assumption that some word forms, stop words, or rare words add a significant amount of noise but contribute little to interpretation of the results (Hopkins and King, 2010; Quinn et al., 2010). This is consistent with and based on previous successful application of the topic modeling approach (see Hopkins and King, 2010; Jacobi et al., 2016; Nowlin, 2016; Törnberg and Törnberg, 2016). First, we stripped the data of formatting and irrelevant information (e.g., references to photos) (Liu, 2011). Second, we used the Czech MorphoDiTa part-of-speech tagger to lemmatize and tag the corpus (Hajič, 2004; Straka and Straková, 2014) and extracted nouns, verbs and adjectives, as these bear most of the meaning of a text. Here, we rely on previous research showing the positive effect of lemmatization on topic modeling results in case of variation-rich languages (May et al., 2016). Third, a previously compiled list of Czech stop words (see Appendix H), punctuation marks, and numbers were dropped from the corpus (Liu, 2011). Fourth, a list of collocations and a list of most frequent words were extracted. Two recoding dictionaries (see Appendix I) were compiled based on an open-coding approach (Rivas, 2012) and then iteratively applied over the corpus. Fifth, we removed rarely used words (occurring in fewer than 5 per 1000 documents). Although some research suggests it is more useful to remove stop words in the post-processing phase (Schofield et al., 2017), we were guided by previous application of similar steps in published research (see Quinn et al., 2010). The corpus was preprocessed using R and its "tm" package (Feinerer et al., 2008; Feinerer and Hornik, 2017; R Core Team, 2017), which shrunk the corpus from 2,994,603 to 1,544,789 words.

The main requirement of LDA is the choice of the number of topics prior to modeling. This may be decided through mathematical procedures, which we discuss in Appendix C. However, selecting the number of topics mathematically does not necessarily facilitate the substantive interpretation of topics (see Chang et al., 2009), which we prioritized in line with Jacobi et al. (2016). We validated this choice by using the word intrusion approach proposed by Chang et al. (2009) and found that a high number of topics failed to provide any additional information from a substantive point of view (see Appendix D). We thus chose a model with 50 topics on substantive grounds. Such model is sufficiently

granular and at the same time provides a significantly relevant number of topics. We further validated our choice by comparing the results of three models (containing 20, 50 and 70 topics), and found there was a large degree of substantive similarity (see Appendix E; Appendix F, and Appendix G for the results). In the process of interpretation, each topic in the model was assigned a topic label which best described the most probable topic terms. In addition, we searched for patterns among topics. Similar topics were assigned a label in a process similar to axial coding (Rivas, 2012). We call these "topic categories." This is in line with the results of precision testing of LDA presented by van Attenveldt et al. (2014), who suggested that complex issues are often represented by more than one topic and that categorization and interpretation of topics are correlated to "issues" contained in the data. This is also corroborated by other research (see Chuang et al., 2013). We refer to this as "first-level aggregation" of topics. We then proceeded with this abstraction one step further, condensing "topic categories" into "broad themes" (i.e., second-level aggregation). By using three levels (topics, topic categories, broad themes), we should be able to fully understand the content (attributes) of the object-related media agenda and thus answer RQ1.

To answer RQ2 and RQ3, we obtained the probabilities of topics for each individual article. The topic that had the highest share of the document content under the model was considered to be representative of the article, i.e. the model suggested that the article focused mostly on that particular topic. In this way we were able to assign topics to documents. We then summed the number of documents for each topic and by doing so obtained distributions of topics (Blei, 2012) and in turn various topic categories and broad themes. These allow for an estimation of attribute salience. The estimated salience at the corpus level allows us to answer RQ2. Breaking down distributions by year allows us to see how the variation in salience has developed over time and thereby to answer RQ3.

5. Case description

While the consumption of solid fuels in the Czech Republic has steadily and continuously decreased over time, and by 2016 constituted only 52.7% of 1990 levels of consumption (Statistical Office of the European Communities, 2017a), the country is still the third-largest coal consumer in the EU. Energy from coal accounted for 39% of annual gross inland energy consumption IEA, 2016 (Statistical Office of the European Communities, 2017b), and the country has the highest per-capita gross domestic consumption of brown coal in the EU and the fourth-highest consumption of bituminous coal (Statistical Office of the European Communities, 2018a, 2018b). Coal still generated 47% of gross electricity production in the Czech Republic in 2017 (Energy Regulatory Office, 2018a) and 60% of the heat produced in central heating systems (Energy Regulatory Office, 2018b). Of these, 83% of electricity and 70% of heat is produced from brown coal (Energy Regulatory Office, 2018b, 2018a).

Such consumption is inextricably linked to the availability of coal in the country, as the vast majority of consumption occurs near domestic mining sites. Given there is no international market for brown coal, its imports and exports are negligible (Starý et al., 2017). The Czech Republic has reserves of bituminous coal, brown coal, as well as lignite. Only brown and bituminous coal continue to be mined to this day; mining of lignite was terminated. Bituminous coal is generally located in the Czech part of the Upper Silesian Basin. Brown coal is located in northern Bohemia, with ongoing opencast mining in the North Bohemian Basin (also frequently referred to as the Most Basin) and the Sokolov Basin (see Fig. 2). According to the Czech Geological Survey, overall exploitable reserves amounted to 25 million metric tons of bituminous coal and 714 million metric tons of brown coal IEA, 2016 (Starý et al., 2017).

Exploitable reserves of bituminous coal are under the control of one company, OKD, and are mined underground (see Table 2). Minable reserves are small and there are no plans to open new fields. The decline in bituminous coal mining is caused by various structural factors, mostly the economic infeasibility of domestic mining caused by low coal prices on the international market (Rečka and Ščasný, 2016). As a result, OKD went bankrupt IEA, 2016 (Czech Press Agency, 2017a). The Czech government, afraid of mass layoffs, intervened and acquired the company with all its debts and plans to shut down its mining activities by 2026 (iDNES.cz, 2018).

There are four brown coal-mining companies that operate opencast mines in Northern Bohemia. Three are in the North Bohemian Basin, while one operates in the Sokolov Basin (see Table 2). Compared to bituminous coal, the future of Czech brown coal is not yet decided. Its role in electricity production is envisaged to gradually diminish (Ministry of Industry and Trade, 2015a). However, domestically mined coal will still play an important role in the heating industry for the foreseeable future.

The coal-mining industry developed from a legacy of excessive coal mining and coal consumption during the communist era. This situation has historically created extremely negative environmental burdens, such as acid rain, soil erosion, water pollution, and severe temperature inversions (Říha et al., 2011) both in Northern Bohemia as well as around the Upper Silesian Basin. The local population in these regions experienced an increased incidence of health issues linked to pollution (Otto et al., 1997; Sram, 2012; Sram et al., 1996). These effects were primarily caused by the fact that coal produced in mining regions is mostly consumed in power plants located close to mining sites.

Moreover, unlike in Upper Silesia, where bituminous coal has been mined underground, the landscape of Northern Bohemia has been drastically affected by open-pit mining. Starting in the 1950s, this practice led to forced relocations of citizens, demolition of numerous villages, and permanent changes to the landscape (Říha et al., 2011). After the fall of communism in 1989, the Czech government of 1991 issued several governmental decrees in which it set territorial boundaries on mining for Northern Bohemian mines (so-called "territorial ecological limits") to prevent further environmental damages as well as the razing of villages (Government of the Czech Republic, 1991; Říha et al., 2011). The limits confine mining sites in both the Sokolov and the Northern Bohemian basins and prevent up to 3.2 billion metric tons of brown coal from being extracted (Valeš et al., 2003). Since they take the legally non-binding form of an executive order (known as a "governmental decree"), there has been a long-lasting conflict between mostly private mining companies and local actors, who fight over the limits' existence and thus the future of brown coal mining and its subsequent use (Frantál, 2016). The conflict is localized around the city of Most and concerns limits at the Czechoslovak Army Mine and the Bílina Mine (see map in Fig. 3). Rescinding the limits at the Czechoslovak Army Mine would unlock roughly 750 million tons of coal (Sivek et al., 2017) but would inevitably lead to the demolition of the town of Horní Jiřetín (with 2,000 inhabitants) and potentially also require the relocation of a refinery in Litvínov. Also, the negative effects of noise and dust pollution would affect the city of Litvínov (with 25,000 residents) in general, and its southwestern neighborhood Janov in particular (Government of the Czech Republic, 2015). This conflict peaked in 2015, when the limits at the less controversial Bílina Mine were rescinded for the first time since their introduction. The decision paved the way for mining expansion and prolongation until 2055 at the Bílina Mine but spared Horní Jiřetín from destruction by protecting limits at the Czechoslovak Army Mine (Sivek et al., 2017).

6. Results

First, we present the content of individual topics, followed by categories and broad themes. Given space constraints, we directly refer only to labels; however, these are presented in detail in Appendix E. Topics, categories and broad themes represent attributes of the coal mining object. Next, we present overall frequencies of topic categories

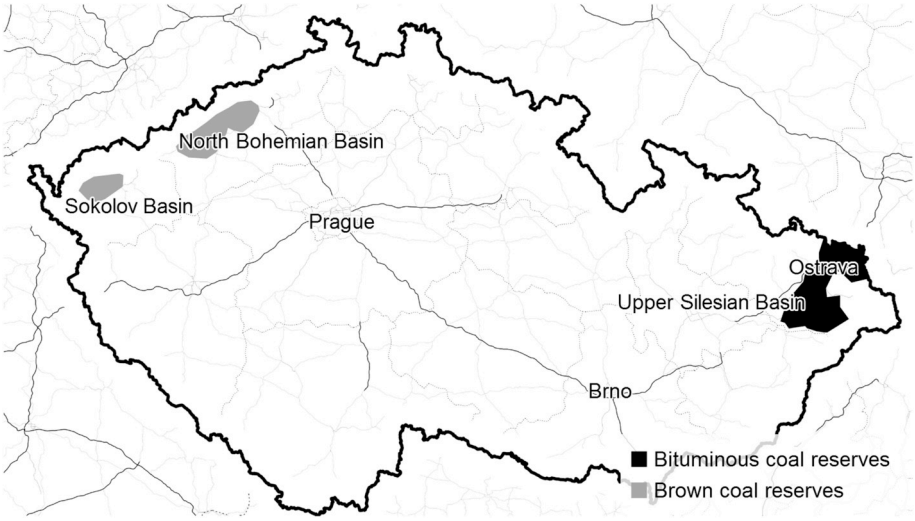

Fig. 2. Map of coal-mining locations in the Czech Republic (Starý et al., 2017).

and broad themes. Last, we present these frequencies broken down by year. These two steps show the salience of attributes.

6.1. Exploration of topics and the media agenda

We first concentrate on topics related to the economy which capture general features of economic activity. Word clusters suggesting the subject of regional growth ("economy_regional_growth"), subsidies ("economy_subsidies"), or industrial production in general ("economy_production") are present in the corpus. Along with general economic topics, the results contain topics focused on individual coal-mining companies. There is a topic representing the bituminous coal-mining company, OKD ("economy_OKD"); two lignite mining companies, Sev.en and Severočeské doly ("economy_MUS_SD"); and an investment group, EPH ("economy_EPH"). This suggests that the media focused to some extent on coverage of the companies' behavior. The presence of OKD, Sev.en, and Severočeské doly indicates reporting on the performance and scandals connected to these large companies, such as issues surrounding the opaque privatization of OKD and Sev.en that took place around the turn of the millennium (Vlček and Černoch, 2013) or the financial issues of OKD leading to its bankruptcy IEA, 2016. At the same time, this also suggests that national media provided space to the companies' representatives to comment on coal-mining issues.

Connected to the economic side of mining, the social aspect of mining is represented by a topic dealing with employment issues and insecurity about future jobs in the mining sector ("social_employment") and a topic covering strikes by miners ("social_miners_strikes"). This follows a narrative of potential negative social impacts felt in the mining regions in the case of a slowdown of mining activity, which is a popular topic among various politicians (Kopecký, 2013).

There are two additional, more specific issues directly related to mining activity. Both capture opposition to further coal extraction in the country. The first is the question of the territorial ecological limits. The results contain a topic suggesting the conflict over mining limits as such ("limits_general_decision") as well as topics representing the uncertain future of the town of Horní Jiřetín ("limits_horni_jiretin"). Second, the object agenda contains topics capturing a more general notion of opposition to coal mining. Environmental organizations (e.g., Greenpeace) and local activists are represented by a specific topic ("mining_opposition_activism"), but uncertainty over bituminous coal mining in Upper Silesia in the city of Frenštát pod Radhoštěm ("mining_frenstat"), where planned underground mining activities were halted in the 1990s and never resumed due to pressure from local municipalities and local activists, is present as well.

The topics also suggest that politics is frequently discussed in relation to mining. Specifically, topics on the election process ("politics_elections"), activities of ministers ("politics_government_members_operations"), and regional politics ("politics_region_usti") emerge. We interpret this primarily as evidence of an interconnection of the discussion about mining in the context of nationwide political cycles and secondly as evidence that political representatives are provided with space to comment on mining. Some topics focus on international relations with Germany ("politics_IR_czech_germany"), the European Union ("politics_IR_EU"), and other countries ("politics_IR_world").

The subject of energy production is covered in one general topic on sources of energy, such as renewables and electricity production, natural gas, oil, as well as their imports ("energy_sources"), and two additional, more specific topics. The first tackles the production of heat from coal and its price ("energy_heat_prices"), reflecting insecurity about future fuel supplies for coal-powered heating plants (Hodboď, 2017) and heating prices, which have been repeatedly used as an argument to extend brown coal mining in Northern Bohemia (Czech Press Agency, 2012; Ministry of Industry and Trade, 2015b). The other topic is related to nuclear energy, which has been envisaged to replace electricity production from coal ("energy_nuclear") by expanding the Temelín nuclear power plant (Osička and Černoch, 2017).

The environmental dimension of the discussion is related to two

Table 2
Operations of coal mining companies (International Energy Agency, 2016).

Company	Coal type	Type of mining	Location	Output (Mt/year)	Active mines
OKD	Bituminous	Underground	Upper Silesian	8.3	4
Severočeské Doly	Brown	Opencast	North Bohemian	21.7	2
Sev.en	Brown	Opencast	North Bohemian	3.8	1
Vršanská Uhelná	Brown	Opencast	North Bohemian	6.5	1
Sokolovská uhelná	Brown	Opencast	Sokolov	6.4	2

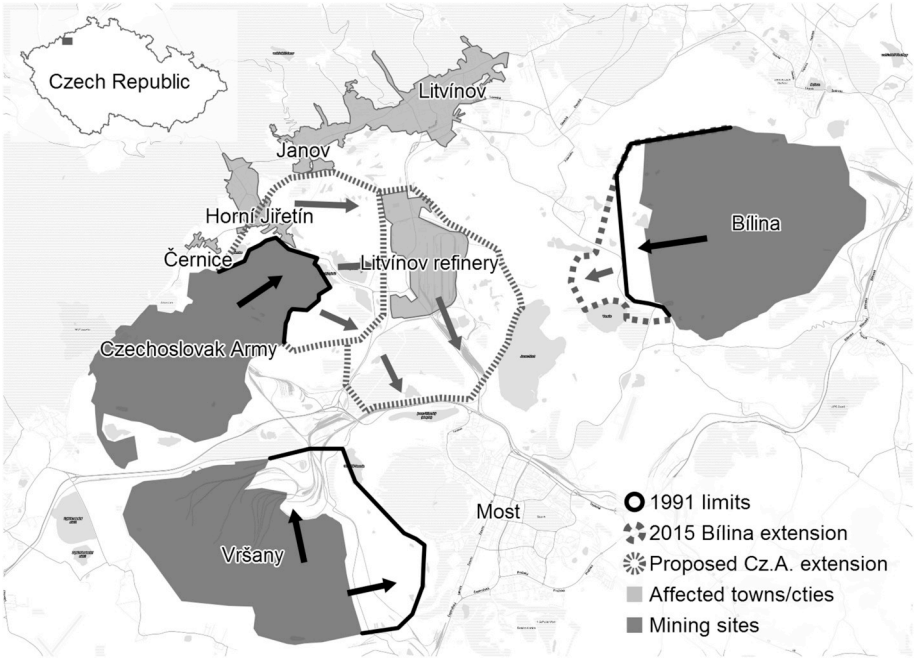

Fig. 3. Territorial ecological limits and mining sites in the North Bohemian (Most) Basin (adapted from Česká televize, 2015, modified by authors).

specific areas—the mitigation of local effects from coal mining, such as the reclamation of mined areas, water management, financing, and subsidies (topics "environment_reclamation" and "environment_reclamation_subsidies")—and more general questions regarding ecology ("environment_ecology") and related research on the environmental impacts of mining ("environment_research").

Lastly, and unsurprisingly, the media agenda also contains topics describing the existence of mining activity itself ("mining_general_activity"), topics capturing locations of previously closed coal mines ("mining_kladno"), or other associated issues such as accidents ("mining_tragedies"). All of these topics were extracted due to the object of the research itself.

6.2. Aggregation of topics into topic categories and broad themes

We were able to reduce the 50 topics mentioned in the previous chapter into 18 topic categories in the first-level aggregation (listed in Table 3). We further consolidated the topic categories into 10 broad themes in the second-level aggregation (listed in Table 4). The "economy" theme brings together general economic topics and topics on specific companies. The theme of the "environment" covers topics on

Table 4
Salience of broad themes.

Broad theme	Absolute frequency	Relative frequency
mining_activity	1467	22.98%
economy	1060	16.60%
politics	1016	15.91%
energy	572	8.96%
culture	515	8.07%
environment	481	7.53%
residual	367	5.75%
social	325	5.09%
other	321	5.03%
city	261	4.09%
Total	**6385**	**100.00%**

Table 3
Salience of topic categories.

Category	Absolute frequency	Relative frequency	Keywords
politics_domestic	660	10.34%	state, government, choice, PM, ČSSD
mining_limits	574	8.99%	limit, village, inhabitant, breach, Horní Jiřetín
economy_companies	563	8.82%	OKD, firm, stock, MUS, privatization
culture	515	8.07%	museum, chateau, exhibition, church, visitor
mining_general	511	8.00%	coal, mine, state, job, mining
economy_general	497	7.78%	firm, domain, profit, production, economy
mining_opposition	382	5.98%	mining, Frenštát, referendum, Litvínov, village
politics_IR	356	5.58%	stay, problem, say, truth, go
energy_specific_aspects	337	5.28%	war, Czech, European, country, USA
social	325	5.09%	price, power plant, nuclear, ČEZ, Temelín
environment_reclamation	321	5.03%	job, miner, unemployment, government, employee
city	261	4.09%	water, lake, reclamation, money, project
energy_general_sources	235	3.68%	city, Most, house, Karviná, Chomutov
environment_general	160	2.51%	energy, energetic, source, gas, fuel
tourism	149	2.33%	environment, landscape, protection, commission, expert
transportation	95	1.49%	place, mountain, road, spring, tourist
legal	77	1.21%	transport, construction, road, highway, Prague
residual	367	5.75%	bureau, court, state, proceedings, case
Total	**6385**	**100.00%**	

reclamation and ecology. “Mining_activity” covers topics on the activity itself, topics related to mining limits, and topics concerning opposition to mining activity. The “politics” theme aggregates topics on domestic and international politics, and the “energy” theme gathers together all topics on energy production. The “social” theme captures social issues, “culture” captures topics on landmarks, and “city” primarily captures locations of mining. These three are the same as their respective topic categories, as there was no overarching theme under which to aggregate them. “Other” places all other interpretable topic categories (e.g., “tourism”, “transport” and “legal”) together. We refer readers to Appendix F for more detailed tables.

6.3. Salience of attributes

The frequencies of articles at the level of topic categories is summarized in Table 3. Keywords represent top topic terms from individual topics. We again refer readers to Appendix E. The topic category capturing domestic politics was the most salient in the object agenda. After that, topic categories on the territorial ecological limits in North Bohemia, mining companies, culture, mining activity, and general economic activity show a similar level of salience to each other. Interestingly, the topic categories capturing environmental aspects seem to be less salient.

Table 4 shows the salience at the level of broad themes. At the higher level of abstraction, the theme of “mining_activity” became the most relevant, constituting almost a quarter of the corpus. It was followed by themes capturing the economy and politics, which seem to be equally salient attributes, together constituting more than 31% of the media content. In contrast, the results show that energy-related and environmental themes are comparatively less salient, on par with topics on culture. These were followed by themes that do not relate to each other and are tangential to the object itself.

6.4. Variation in topic salience over time

In this section, we further elaborate on the results presented in Tables 3 and 4 by looking at the variation in attribute salience over time. In the first step we present the variation in the salience of broad themes as such, and in the second step we look at the variation on an annual basis. Apart from the environmental theme, we omitted themes of low salience because we found their further discussion to be rather uninformative.

The box and whisker chart in Fig. 4 captures the temporal variation in the salience of broad themes along with their median, mean, and extreme values (McGill et al., 1978), ordered from left to right according to highest mean salience. The order (average coverage) corresponds to the absolute coverage captured in Table 4. Coverage surrounding the theme of mining activity is the most salient, but this salience fluctuates considerably. Some years saw spikes in coverage, as captured by the large spread of the whiskers, while in other years the coverage was stable, as captured by the relatively low height of the box (interquartile range). The salience in 2015 is even beyond the standard outlier range. This is likely caused by the dramatic shift in policy rescinding the mining limits at the Bílina Mine at the end of that year. The salience variation of the economy theme is the highest, given the largest height of the box. However, there are no extreme spikes in the economy theme. The saliences of politics, energy, and the environment vary less as compared to economy and mining activity. There were two considerable spikes in the coverage of energy compared to other years – the first in 2000 and the second in 2011. We expect that this increased coverage was caused by topics regarding nuclear energy, as these spikes coincided with the commissioning of the Temelín nuclear power plant in 2000 and the Fukushima disaster in 2011. The variation of the environmental theme is the lowest relative to the other broad themes.

The second step of the variation analysis brings us to the discussion of theme and category frequency in individual years. We also included the most frequent topic category within each theme, which allows us to better understand the origins of theme variation. The combined results are shown in Fig. 5, ordered again from the highest mean salience on the left.

First, we analyzed the theme of mining activity along with the topic category “mining_limits.” As suggested in the previous step, this theme contains a few considerable spikes, notably between 2005 and 2007, and in 2015. This is apparently driven by significant coverage of the debate over the mining limits, which became highly politicized between 2005 and 2007. Local referenda on mining expansion were held in Horní Jiřetín in 2005 and in Litvínov in 2006. The slight increase in salience of the limits again in 2009, 2010 and 2013 corresponds with attempts or deliberations on the part of Czech governments to rescind the limits. The peak in 2015 clearly corresponds to the government's decision to rescind the limits at Bílina, as discussed in detail in the case description chapter above.

The economy theme is mostly driven by the frequency of the category on individual companies. The salience of economic themes appears to have been high until 2004 but then to fall between 2004 and 2008. After that, the salience fluctuates, with higher spikes in 2009,

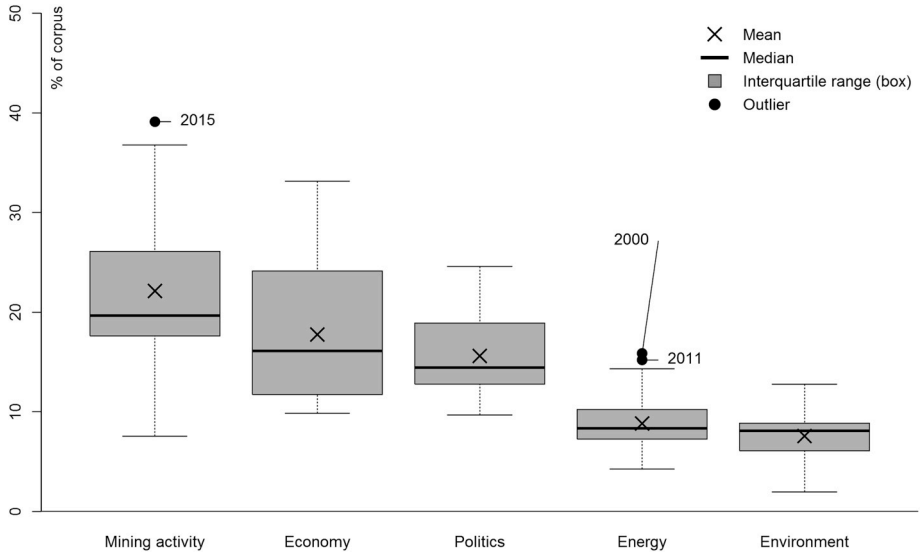

Fig. 4. Salience of broad themes – aggregated temporal variation.

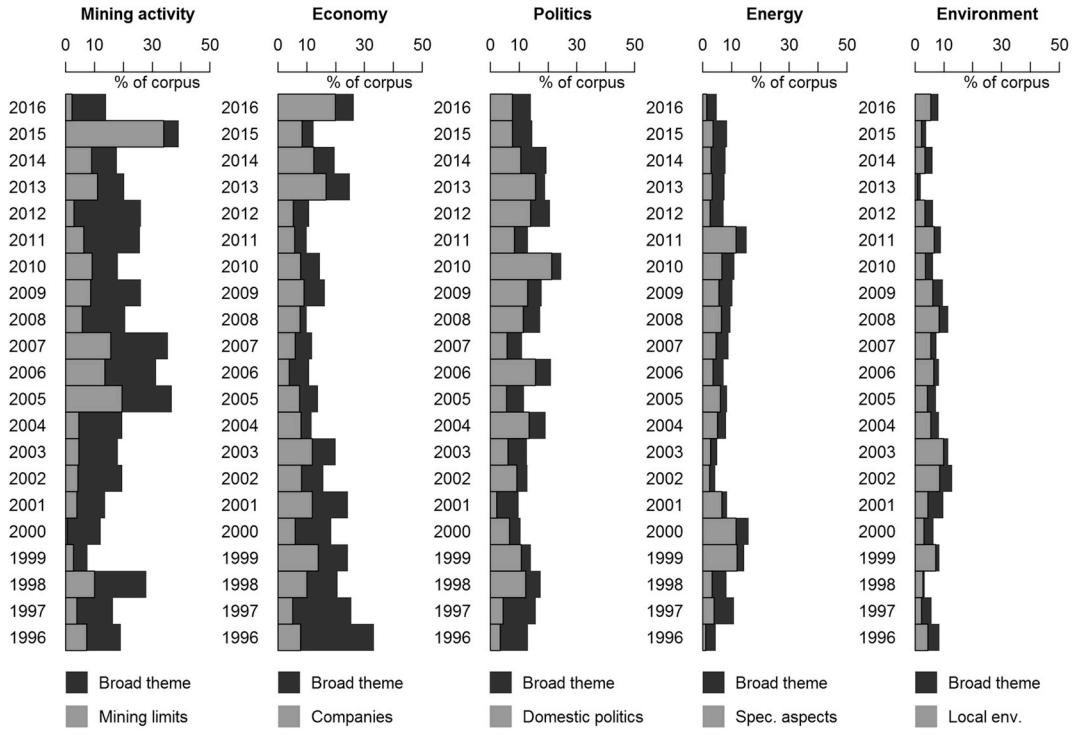

Fig. 5. Salience of broad themes and their most frequent categories – annual variation.

2013 and 2016. Many of these spikes seem to have been driven by coverage of companies' performance. From 1999, the salience of the economy theme became increasingly driven by the topic category incorporating individual companies. The company-oriented topic category rises in 1999, when scandals around the privatization of OKD and Mostecká uhelná společnost (MUS), constituting part of the Sev.en corporation, became apparent. Both companies were acquired by private entities under unclear circumstances, with the state losing its controlling stake. The coverage rose again in 2003, when the Czech government sold the rest of its shares in OKD and MUS at a price far below market value (Klímová, 2018; Matějček, 2013; Vejvodová, 2013; Žižka, 2013). The 2016 salience spike corresponds closely to the uncertainty over the poor economic results of the OKD corporation, followed by its bankruptcy filing (Czech Press Agency, 2017a; iDNES.cz, 2018).

The salience of the politics theme was predominantly driven by articles falling under the topic category of "domestic politics." This is apparent from spikes in 2006, 2010 and 2013, corresponding to both municipal and national elections, as well as 2004 and 2008, when regional elections were held. Domestic political actors seem to be keen on commenting on mining, and the future of coal mining seems to have played a significant role in the campaign debates of political parties and their candidates.

The energy theme is depicted along with the topic category grouping specific energy technologies and sources, which themselves seem to drive the salience of energy-related articles. There were notable spikes in the salience of this topic category in 1999, 2000, and again in 2011. As suggested before, the first two spikes correspond to the time when the Temelín nuclear power plant, with its two 1000 MW blocks, came into operation. The debate on nuclear power is connected to the debate on coal, as the justification for new nuclear development was partially based on the need to replace the diminishing reserves of (polluting) coal. The 2011 spike corresponds to the time of the Fukushima disaster and the subsequent decision of Germany to phase out its nuclear program.

The final theme is that of the environment, along with the topic category of environmental reclamation. Interestingly, there is no significant variation in the environmental theme, and the theme seems to be entirely driven by discussion of local environmental issues, such as water availability and the reclamation of exhausted areas. This observation is surprising to us, as we expected increased coverage specifically around years where important international developments took place, e.g. in 2007, when the Fourth Assessment Report of the IPCC was published, or 2009 and 2015, when the Copenhagen COP15 and the Paris COP21 global climate conferences were held. After all, these spikes were shown to be present and reflected in the media coverage of climate change in various other countries (Schmidt et al., 2013).

7. Conclusions and policy implications

The theoretical chapter established agenda setting as the focal point of our paper. We were particularly interested in second-order agenda setting, i.e. the attributes (themes, issues) of coal mining and their salience in the media.

This discussion appears to be dominated by the topic of mining itself, with specific attention given to the issue of the territorial limits restricting brown coal mining. Considering the enormous impact these limits have on the profitability of mining companies as well as the producers of heat and electricity, the environmental wellbeing of impacted communities, and the economy as a whole, and knowing that their rescindment would result in the destruction of the town of Horní Jiřetín and in other negative impacts on the nearby city of Litvínov, their prominent position as the most salient attribute is unsurprising.

Apart from that, however, there are three counterintuitive findings revealed by the analysis. First, despite the very strong emphasis of the Czech government on the energy security benefits of domestically-sourced coal, this issue is completely absent in media coverage. Second, in striking contrast to the currently dominant narratives in other places, environmental issues have a negligible salience in the Czech media discourse on coal mining. What is even more surprising, the link between coal mining and climate change is missing altogether. Third, within the predominant economic perspective on mining, coverage of the health, profitability and very existence of mining companies stands out.

The absence of energy supply security topics is very surprising considering the strong emphasis on security of supply in the country's energy policy (Osička and Černoch, 2017). The importance of domestic coal sources for the country's energy security remains a pivotal part of the political discourse. The State Energy Policy, a 2004 document, emphasized that exploitation of domestic sources of coal was "a goal with a very high priority" in order to "slow down the pace of increasing energy dependence from foreign sources" (Ministry of Industry and Trade, 2004). An update of this Policy from 2010 reaffirmed this vision, calling for "maximization of the utilization of domestic sources to ensure the security of supply" by "removal of non-systemic administrative barriers of coal exploration, including territorial ecological limits" (Ministry of Industry and Trade, 2010). Only the latest version, from 2015, adopted a more conciliatory tone regarding the depletion of coal resources and the territorial limits, though it still framed coal as a security issue: "despite some environmental issues of coal consumption, this domestic commodity … is not fully replaceable, due to security and economic reasons" (Ministry of Industry and Trade, 2015a). This emphasis on the security benefits of domestic coal is not, however, reflected in the media coverage. No topic contains terms referring to the security dimension of coal, such as "security," "independence," or "self-sufficiency." In this case, the lack of media salience is in stark contrast with the language of the strategic energy documents of the Czech government. We attribute this result to "negativity bias," i.e. the general preference for negative news by mass media (Soroka, 2016). Since the coal industry, unlike, for example, the gas industry, has not faced any major supply crisis throughout the selected timeframe, there has been very little incentive for the media to emphasize the positive energy security effects of domestically sourced coal.

The most startling outcome, however, results from the very little attention paid to the environmental issues caused by coal mining. The "environment_reclamation" topic category, which refers to the reclamation of mining territories, emerged only in 5.03% of articles. All other local impacts, aggregated in the "environment" topic category, were present in only 2.51% of articles. This suggests an extremely low salience of the environmental dimension of coal mining, in stark contrast to what we expected considering the prevailing EU public and political discourse and ongoing academic and professional debate. In contrast with the conclusions of Bacon and Nash, who showed the coverage of climate change in Australian newspapers to vary by news source (Bacon and Nash, 2012), the Czech debate lacks this dimension whatsoever. The results suggest that media organizations separate coal mining from coal combustion, neglecting the inevitable interconnection of these two processes. This missing link, suggested by the low salience of the environmental dimension, is of special importance in the case of brown coal. Since there is very little cross-border trade with this commodity (Starý et al., 2017), brown coal mining in a given country would eventually result in the utilization of the produced coal in power and heat generation in the same country, with greenhouse gases being produced. Such disentanglement of production and consumption appears to be highly selective: while the composition of the "energy" theme indicates that production and consumption are firmly intertwined and embedded together in a context defined by the country's energy market (e.g., nuclear power and heat), the "environment" theme entirely lacks terms that clearly relate to coal consumption. The absence of this reasoning is in line with a more general observation made by Healy and Barry (2017)—while greenhouse gas emissions are discussed intensively in (international) climate negotiations, approaches seeking to specifically limit and end fossil fuel extraction are largely marginalized.

The third noteworthy outcome—the emphasis on the well-being of the mining companies—can be partially attributed to the circumstances surrounding the mining companies themselves. Due to the 2011–2015 coal price collapse, the OKD mining company went bankrupt, and Czech political institutions had to deal with the possibility of an unplanned and rapid regional coal phase-out. Faced with the clearly negative socioeconomic consequences of such a development, the political response focused primarily on maintaining employment in the region. This required continuing with production and keeping the company on life support. The attention paid to mining companies in the media can be further attributed to the criminal investigation into the privatization of OKD (Czech Press Agency, 2017b; Klímová, 2018) and two ongoing criminal investigations into the privatization of Sev.en (and its predecessor Mostecká uhelná společnost) (Žižka, 2013). What also seems to matter is the fact that two public figures with major political responsibility for the privatization of the aforementioned companies, former Prime Minister Miloš Zeman and former Finance Minister Bohuslav Sobotka, still are, or until recently were, active in politics—Miloš Zeman is currently serving as Czech President and Bohuslav Sobotka was Prime Minister between 2014 and 2017 (Klímová, 2018). Notwithstanding the expected coverage, the number of economically and politically oriented topics and their frequency suggests the object agenda is concerned with economic and political aspects well beyond sensational news. The salience of subjects such as growth, profit, and the health and performance of private companies, as well as related questions of social welfare for employees, point to a company-centered media perspective. Again, this is consistent with conclusions discussed by Bacon and Nash, who showed business narratives were important across newspapers despite their ideological affiliation, highlighting the economic benefits of the coal industry (Bacon and Nash, 2012).

The policy implications of the presented analysis stem mostly from two findings: the selective disentanglement of coal production and consumption and the emphasis on the well-being of private mining companies. In line with agenda-setting theory, the high salience of these two issues may likely co-create a permissive discursive environment in which extraordinary political measures are easier to implement. Similarly, the low salience of other issues indicates that related extraordinary measures may be more difficult to justify.

In practical terms, the marginalization of the environmental and climate dimensions of coal mining indicates that coal phase-out policies driven by environmental concerns, as in countries such as Germany and the Netherlands, lose a fair share of their justification in the Czech political environment. With coal production being discursively disentangled from consumption, the risk of adopting contradictory climate and energy policies increases. While there are policies in place to target carbon emissions, such as the Policy of Climate Protection and the Policy of Air Protection, (Ministry of Environment, 2017, 2016), other policies and measures, such as throwing a lifeline to OKD, directly contradict them. One such example is the first call of a government program that provided subsidies to households modernizing their domestic boilers. The call included coal-fired boilers among the supported technologies (Ministry of Environment, 2015). As a result, the program not only compromised the country's effort to reduce carbon emissions but created an effective fuel lock-in in a sector where the fuel supply (i.e., coal) is already insufficient (VUPEK - ECONOMY s.r.o., 2015). The households which exchanged their obsolete coal-fired boilers for modern ones will be stuck with this decision for decades to come. This will stimulate demand for coal and consequently also its production. The boiler renewal program well illustrates what appears to be a pattern of contradictory policies: public resources are simultaneously invested in emission reduction measures and in protecting coal-mining companies.

The emphasis on the economic health of private mining companies is manifested in the high salience of the topics associated with economics. In a discursive environment like this, it might seem only logical that policies vis-à-vis the socioeconomic aspects of coal mining would aim at the economic sustainability of existing production facilities. If the wellbeing of these companies is so closely monitored, any decline in their activities will be perceived with more caution by both the general public and policymakers, as they might seem "too big to fail" (see Nuttall et al., 2011). Hence, they may enjoy an extraordinary level of

protection, as well as being in a better position to request extraordinary measures (e.g., public financing) in the case of failure. Thus uncompetitive industries are protected and phase-out policies are further hindered (Lovins, 2017). In fact, the issue of the economic viability of private mining companies is occasionally securitized by the media—a rather paradoxical discovery considering the general lack of energy security issues in the Czech media. Such an interpretation again appears in line with the empirical examples, such as the fate of the OKD company. In 2016, the Czech government had lent an extraordinary sum of money to OKD to keep it afloat (Czech Press Agency, 2017a). Despite the state aid, the company filed for bankruptcy later that year anyway (Rečka and Ščasný, 2016), as previously mentioned. After that, the Government decided to buy out the company, together with its debts and obligations. We assume that these moves would be more unlikely if there were no permissive discourse already in place. The high salience of economic and social issues in media messages certainly support and solidify such permissiveness.

To conclude, the results of the analysis suggest that in its reflection of coal mining the Czech media has cultivated and co-created a discursive environment in which coal consumption is not characterized as an environmental problem and in which economic problems of private companies become public problems more easily. In such an environment, future policies vis-à-vis coal mining will be more likely to be driven by the existing socioeconomic path dependencies than by environmental and climate concerns and by attempts to weaken already implemented climate-protection measures (territorial limits) instead of strengthening them.

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Appendix A. Supplementary data

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